

Attorney's Docket: 2000DE439Serial No.: 10/035,522Art Unit 11/09/01Response to Final Office Action of 10/28/2003**REMARKS**

The Office Action mailed October 28, 2003 has been carefully considered together with each of the references cited therein. Attached to this response is a Petition for a 1-Month Extension of Time with a fee of \$110 under 37CFR 1.17(a)(1) extending the time for a response to 28 February 2004, and a Request for Continued Examination (RCE) accompanied by a fee of \$770 under 37 CFR 1.17(e). The Commissioner is authorized to \$880 and any additional fees to Deposit Account No. 03-2060. The amendments and remarks presented herein are believed to be fully responsive to the Office Action. Accordingly, reconsideration of the present Application in view of the following remarks is respectfully requested.

Applicant has amended the claims to attend to housekeeping and to more clearly define that which the Applicant believes to be the invention. Claims 1, 10 and 11 now recite that the amines of B) have at least "one C₃-C₈ branched alkyl". Support for this amendment may be found in Applicant's Specification in paragraph [0023]. In claims 17 and 18, certain amine species were removed to be consistent with amended claims 1, 10 and 11. It is believed that no new matter has been added by these amendments.

Applicant has developed a solution to the problem of maintaining stable cold flow properties in low sulfur fuel oil at low temperatures. Prior to Applicant's invention, it was necessary to heat additives before mixing them with fuel oil, and often it was necessary to maintain the entire storage fuel oil vessel at an elevated temperature in order to provide the fuel oil with stability and enhanced lubricity. Applicant has discovered a particular group of compounds which can be stored,

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mixed, and employed at low temperatures to enhance the lubricity of low sulfur fuel oil. More particularly, Applicant's invention relates to additive compositions comprising salts of fatty acids with "short chain branched", oil-soluble amines which surprisingly provide enhanced lubricity to fuel oils with the particular advantage that the additive composition does not have to be heated before being added to the fuel oil and that the additive composition in concentrated or dilute form which remain homogeneous, clear and flowable at low temperatures. By the term "short chain branched" Applicant refers not only to the length of the carbon chain which is branched, but also the bonding of the amino group to a secondary or tertiary carbon atom in the alkyl radical. Particularly, the compositions of the present invention are primary, secondary and tertiary amines of the formula $NR^1R^2R^3$, wherein none of the alkyl branches have more than 18 carbon atoms and at least one of the alkyl branches $R^1R^2R^3$ are a C_3 - C_8 branched alkyl and wherein each of the branched alkyl groups have a secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. Surprisingly, the additive compositions of the present invention, unlike those of the prior art, do not require heating nor do they require that the fuel oil/additive mixture be maintained at an elevated temperature (greater than or equal to 35°C). The fuel oil/ additive mixtures of the present invention remained flowable and clear for prolonged periods at substantially lower temperatures, such as to below -20°C , while still providing an enhanced lubricity to middle distillate fuel oils. Applicant demonstrated this unexpected performance data in Table 3 of Applicant's Specification wherein Applicant compared additive materials of the present invention (Examples 14-21)

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with additives that do not have Applicant's short chain branched structure (Examples 23-26). The additive compounds of the present invention remained clear and viscous fluids at temperatures of -25°C for 3 days, while additive compositions of the prior art became a waxy solid or a crystalline solid. In Table 5, Applicant demonstrated that the additives of the present invention (Examples 28-35) provided the equivalent or better lubricity performance than additives without Applicant's short chain branched structure (Examples 37-40). Similar results were shown in Table 6 for different test oil.

Claims 1-6 and 9-18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 (Chandler), combined with Applicant's admission concerning EP 0,798,364, and Friedrich et al. (Friedrich (4,732,576)). The rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 (Chandler), combined with Applicant's admission concerning EP 0,798,364, and Friedrich et al. (Friedrich (4,732,576)) should be withdrawn for the reason that the examiner has presented no line of reasoning, and we know of none, as to why the artisan viewing only the collective teachings of the references would have found it obvious to selectively pick and choose various elements from the several references relied on to arrive at the claimed invention. In the instant application, the examiner has done little more than cite references to show that one or more elements or sub combinations thereof, when each is viewed in a vacuum, is known. The claimed invention is clearly directed to a combination of elements. That is to say, the applicant does not claim that he has invented one or more new elements but has presented claims to a new combination of elements. To support the

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conclusion the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. There is nothing in the references that would expressly or impliedly teach or suggest the modifications urged by the examiner. No one skilled in the art of lubricity improvement in fuel oils would have found it obvious to selectively pick and choose elements or concepts from the various references so as to arrive at the claimed invention without using the Applicant's claims as a guide. It is to be noted that simplicity and hindsight are not proper criteria for resolving the issue of obviousness. Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave. While analogy is at times useful, organic chemistry is essentially an experimental science and results are often uncertain, unpredictable, and unexpected. No one skilled in the art armed with the Chandler patent and even in combination with the EP reference, and/or Friedrich would be motivated to select Applicant's specific branched, aliphatic amines with **short chain branched** radicals wherein each of the branched alkyl groups have at least one C₃-C₈ group branched alkyl group and wherein the branched alkyl group has secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom in order to produce a fuel additive for low sulfur oils which can be blended at low temperature conditions. Furthermore, Applicant has presented a showing of unexpected results different from

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the prior art. An invention may be patentable, particularly where the prior art indicates that the procedure followed by the Applicant will be unproductive. None of the references cited by the examiner showed any advantage in low temperature additive blending. Chandler discloses a method of enhancing the low temperature flow properties of fuels. Chandler is silent on any influence of the disclosed compounds on lubricity of low sulfur fuel oils. The Chandler methods comprise adding to fuel oil a heated additive concentrate. The heated additive concentrate comprises at least one nitrogen-containing derivative of carboxylic acid, an organic acid, and at least one other flow improver, wherein the concentrate is heated to at least about 35°C to avoid solidification of the concentrate. Chandler in the paragraph bridging column 2 and 3 and starting at line 54 of column 2, discloses that one of the components of the heated fuel additive concentrate is a nitrogen containing compound having a multitude of groups including straight chain or branched, saturated or unsaturated, aliphatic, cycloaliphatic, aryl, alkaryl, etc. Chandler further discloses that other groups such as hydroxyl, carbonyl, ester oxygen, sulfur, chlorine, etc. may also be present. Chandler emphasizes that these groups will usually be **long chain, e.g. C₁₂ to C₄₀ or C₁₄ to C₂₄**. Chandler requires that the length be sufficient for solubility in oil and in column 4 lines 14-16 it is disclosed that the compound should have at least **one straight chain alkyl segment containing from 8 to 40, for example, 12 to 30 carbon atoms**. Thus, Chandler discloses a full range of amines in column 3, line 2 to Column 4, line 11. Amine mixtures of natural amines are also disclosed. **Coco amines having straight chain alkyl groups ranging from C₈ to C₁₈ and tallow amines, derived from hydrogenated tallow (a mixture**

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of C₁₄ to C₁₈ straight chain alkyl groups) are disclosed as particularly preferred. These natural amines have straight chained, not branched alkyl groups. Thus, the disclosure of Chandler is of such a broad scope as to include thousands or even tens of thousands of amines. Thus, one skilled in the art can only conclude that the Chandler reference is anything but a broad disclosure of all of the possible combinations of an amine and a fatty acid with straight and branched chains of up to 40 carbon atoms in length, for use as a fuel oil additive, and that the additive must be heated to avoid solidification. Chandler does not disclose that its heated additive provides any advantage for improving lubricity of fuel oils and the additives disclosed in Chandler require heating to achieve stability in fuels. The Chandler reference does not disclose Applicant's specific short chain branched structure. Furthermore, as evidenced by Chandler's requirement for the heating of the additive concentrate, one skilled in the art would not be led to Applicant's particular short chain branched structure as now claimed for which Applicant demonstrated unexpected low temperature stability and enhanced lubricity in low sulfur fuels as presented hereinabove. In fact, the Chandler reference provides no one skilled in the art any motivation toward Applicant's low temperature additive invention by Chandler's requirement to provide the Chandler additive as a heated composition.

EP reference 0798364 discloses a diesel fuel additive comprising a salt of a carboxylic acid and an aliphatic amine or amide obtained by dehydration-condensation between a carboxylic acid and an aliphatic amine having 8 to 20 carbon atoms (See page 2, lines 41 to 42). The fuel oil additive of EP reference 0798364 is disclosed to be combined into a diesel fuel to improve the lubricity of the

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diesel fuel. The Examiner further suggests that EP reference 0798364 does disclose similar compositions to Chandler, and the EP reference discloses that such compositions improve the lubricity of low sulfur fuels. Thus, the Examiner is relying on the combination of the Chandler reference and the EP reference to show that Applicant's composition is obvious to one skilled in the art for the improvement of lubricity in fuel oils. Again, the EP reference represents a very broad disclosure of the combination of amines with aliphatic acids, without disclosing the specific structure of Applicant's additive as discussed hereinabove having a short chain branched structure. As discussed hereinabove, the Chandler reference does not disclose Applicant's particular short chain structure which Applicant has shown to provide unexpected low temperature stability and lubricity performance in fuel oils. The EP reference does not disclose Applicant's short chain branched structure wherein the amines have at least one C₃-C₈ branched alkyl group and wherein the branched alkyl groups R¹, R², and R³ have a secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. There is no disclosure in the EP reference which shows any evidence of **low temperature stability or the low temperature blending benefits of Applicant's invention**. All of the HFRR lubricity tests in the EP reference were carried out at 60°C, and there is no disclosure in the EP reference to suggest that the additive disclosed broadly in the EP reference is any different from the broadly disclosed heated additive of Chandler. Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave. While analogy is

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at times useful, organic chemistry is essentially an experimental science and results are often uncertain, unpredictable, and unexpected. No one skilled in the art armed with the Chandler patent and even in combination with the EP reference would be motivated to select Applicant's specific branched, aliphatic amines with short chain branched radicals wherein each of the branched alkyl groups have at least one C₃ - C₈ group branched alkyl group and wherein the branched alkyl group has secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. And there is no suggestion that any compound within the broad range disclosed by both the Chandler and the EP reference would provide the solution to the problem which Applicant discovered which provided low temperature storage stability while still providing lubricity improvement to low sulfur fuel oil compositions. Only in Applicant's specification is it disclosed that the compositions of the present invention are primary, secondary and tertiary amines which have at least one C₃-C₈ branched alkyl groups and wherein each of the branched alkyl groups have a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. The totality of the prior art disclosures would provide no motivation to one skilled in the art to obtain Applicant's invention for the reason that both references require a heated additive or heated fuel mixture to obtain stability. The teachings are to be viewed as they would have been viewed by one of ordinary skill. It is impermissible within the framework of 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary for the full appreciation of what the reference fairly suggests to one skilled in the art. The references all suggest that the additives improve fuel

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properties. No reference suggests that the additive is low temperature storage stable. Chandler requires heating of the additive, thus not providing any motivation or teaching the Applicant's composition for low temperature stability, and the EP reference is only relied on to provide the lubricity property to essentially the same broad amine disclosure of the Chandler reference. The data provided by the Applicant clearly shows surprisingly significant stability and storage advantages to the instant claimed invention. Proceeding contrary to accepted wisdom is strong evidence of unobviousness.

Regarding the Friedrich reference, the Examiner states that Friedrich teaches that **tallow oil fatty acids** have **resin content** and thus concluded that Friedrich renders obvious a **combination of resin acids and tall oils**. The Examiner further suggests that Friedrich teaches branched alkyl chains from 4-12 carbon atoms for carboxylic acids. This is not quite correct. In column 4, lines 56-59, Friedrich refers to alkylbenzene carboxylic acids as having a 4-12 carbon atoms in the alkyl chain and does not refer to the amine component of the carboxylic acid amides. Furthermore, **tall oil fatty acid** and **tallow fatty acids** are not the same. Tall oil is a highly unsaturated C₁₈ fatty acid from pine trees, while tallow fatty acid is usually saturated C₁₈-C₁₈ fatty acid from beef fat. Resin acids are unsaturated terpenoid carboxylic acids of the formula C₂₀H₃₀O₂, they have varying structures, and are a product of pine trees. In Applicant's claims, **Applicant refers to tall oils, not tallow oils**. Therefore, the Examiner's suggestion that Friedrich teaches an association between tall oil fatty acids and resin acids is incorrect and any rejection based on such an association should be withdrawn.

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Therefore the rejection of claim 1, as amended, under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834, Applicant's admission concerning EP 0,798,364, and Friedrich should be withdrawn for the reason that Chandler does not disclose the fuel oil composition or additive with specific short chain branched radicals bonded to the nitrogen atom in the primary, secondary and tertiary amines of the present invention and Chandler provides no motivation to one skilled in the art and in fact can be said to teach away from the instant invention by requiring that the improver can be further enhanced by heating the concentrate prior to addition to the fuel to overcome a solubility problem. The EP reference is only relied upon to provide the inherent lubricity improvement to the broad range of materials disclose in Chandler. Applicant's showing of unexpected low temperature storage results for the particular compounds identified by Applicant, in the face of the Chandler reference teaching away from the instant invention is strong evidence of unobviousness. No one skilled in the art armed with either the Chandler reference or the EP reference, or in light of the Friedrich reference would be motivated to select Applicant's particular compounds from the thousands of structures represented by the Chandler and/or EP disclosures. There is nothing in the references that would expressly or impliedly teach or suggest the modifications urged by the examiner. No one skilled in the art of lubricity improvement in fuel oils would have found it obvious to selectively pick and choose elements or concepts from the various references so as to arrive at the claimed invention without using the Applicant's claims as a guide. It is to be noted that simplicity and hindsight are not proper criteria for resolving the issue of obviousness.

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The rejection of claims 2-6 and 9-18 under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 and Applicant's admission concerning EP 0,798,364 should be withdrawn for the reasons given in support of amended claim 1, from which they depend. The rejection of claims 16 and 18 under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 and Applicant's admission concerning EP 0,798,364 should be withdrawn for the reasons given in support of claim 1 from which they depend and for the reason that tall oil fatty acids are not the same as tallow oil fatty acids and the combination of resins with tallow oil fatty acids as disclosed in Friedrich does not relate to any such combination of resin acids with tall oil fatty acids.

It is respectfully submitted that, in view of the above remarks, the objection to the Specification, the rejections under 35 U.S.C. 103, should be withdrawn and that this application is in a condition for an allowance of all pending claims. Accordingly, favorable reconsideration and an allowance of all pending claims are courteously solicited.

An early and favorable action on the merits is respectfully requested.

Respectfully submitted,



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